WHAT IS CLAIMED IS:

1. A micro-chip assembly, which comprises:

first and second alignment elements;

a first substrate having a front surface which faces a first direction, the front surface including at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the first alignment element;

a second substrate having a front surface which faces the first direction, the front surface including at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment element, said second substrate including a periphery which extends beyond the periphery of said first substrate;

a third substrate having first and second depressions disposed thereon for engaging the opposite ends of the first and second alignment elements;

wherein said first substrate is disposed between said second substrate and said third substrate; and

whereby said first and second substrates are passively aligned.

2. A micro-chip assembly according to claim 1 wherein at least one of said first and second alignments elements is spherical.

3. A micro-chip assembly according to claim 1 wherein at least one of said first and second alignment elements is a horizontally-disposed cylinder.

4. A micro-chip assembly according to claim 1 wherein said microcomponents of said first and second front surfaces of said first and second substrates are lenses and optical fibers.

5. A micro-chip assembly according to claim 1 wherein at least one of said depressions of at least one of said first substrate, said second substrate and said third substrate is defined between two raised surfaces.

6. A micro-chip assembly according to claim 1 wherein at least one of said depressions of at least one of said first substrate and said second substrate is defined between two raised surfaces.

7. A micro-chip assembly, which comprises:

first and second alignment elements;

a first substrate having a front surface which faces a first direction, the front surface including at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the first alignment element;

a second substrate having a front surface which faces the first direction, the front surface including at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment element;

wherein said first substrate is disposed above the front surface of the second substrate and said second substrate includes a periphery which extends beyond said first substrate; and

wherein at least one of said depressions of said second substrate is disposed within the periphery of said second substrate.

8. A micro-chip assembly according to claim 7 wherein at least one of said first and second alignments elements is spherical.

9. A micro-chip assembly according to claim 7 wherein at least one of said first and second alignment elements is a horizontally-disposed cylinder.

10. A micro-chip assembly according to claim 7 wherein said microcomponents of said first and second front surfaces of said first and second substrates are lenses and optical fibers.

11. A micro-chip assembly according to claim 7 wherein at least one of said depressions of at least one of said first substrate and said second substrate is defined between two raised surfaces.

12. An apparatus for aligning a first substrate having at least one micro-component disposed thereon relative to a second substrate having at least one micro-component disposed thereon, each of the substrates including a front surface oriented in the same direction, the first substrate being disposed between the alignment apparatus and the second substrate, the second substrate including a periphery which extends beyond the first substrate and at least one depression on the front surface of the second substrate is disposed within the periphery of the second substrate, the apparatus comprising:

a first depression for mechanically engaging one end of a first alignment element, said first alignment element including an opposite end which engages a depression disposed on the front surface of the first substrate;

at least one second depression for mechanically engaging one end of a second alignment element, said second alignment element including an opposite end which engages a depression disposed on the front surface of the second substrate; and

Said first and second depressions being spaced apart to provide a desired relative alignment between the micro-components disposed on said first and second substrates

said first and second depressions and said alignment elements cooperating to passively align micro-components disposed on each of said substrates.

13. An apparatus according to claim 12 wherein a gap exists between the first and second substrates.

14. An apparatus according to claim 12 wherein at least one of said depressions of at least one of said first substrate, said second substrate and said alignment apparatus is defined between two raised surfaces.

15. An apparatus for aligning a first substrate relative to a second substrate wherein the first substrate includes a front surface , a rear surface and at least one micro-component disposed on the front surface and the second substrate includes a front surface, a rear surface and at least one micro-component disposed on the front surface and wherein the front surfaces of the first and second substrates are oriented in the same direction, the apparatus comprising:

a pyramidally-shaped alignment member having a pair of side surfaces and an apex mechanically receivable within a recess disposed in said front surface of the first substrate;

said apex configured to partially project through the rear surface of said first substrate to mechanically engage a recess disposed on the front surface of the second substrate; and

said side surfaces and said apex cooperating to passively align the micro-components disposed on each of said substrates.

16. An assembly for aligning first and second substrates each having at least one micro-component disposed thereon, each of said substrates including a front surface which faces a first direction and opposing side surfaces which face one or more second directions, said assembly comprising:

a first retaining member having a side interface which mechanically engages a corresponding side interface disposed on a first side surface of the first substrate and a bottom depression which cooperates with an alignment element to mechanically engage a corresponding depression disposed on the front surface of the second substrate;

a second retaining member having a side interface which mechanically engages a corresponding side interface disposed on a second side surface of the first substrate and a bottom depression which cooperates with a second alignment element to mechanically engage a corresponding depression disposed on the front surface of the second substrate,

said first and second retaining members cooperating to passively align corresponding micro-components disposed on each of the substrates.

17. An assembly according to claim 16 wherein said side interfaces of the first and second retaining members include angles which mechanically compliment the angles disposed on said first and second side surfaces of the first substrate, each of said angles cooperating to passively align micro-components disposed on each of the substrates.

18. A method for mechanically aligning micro-components disposed on first and second substrates, comprising the steps of:

providing first and second substrates each having micro-components disposed thereon and a front surface including at least one depression which faces the same direction;

providing an alignment member having:

a first depression for mechanically engaging one end of a first alignment element, said first alignment element including an opposite end which engages a recess disposed on the front surface of the first substrate;

at least one second depression for mechanically engaging one end of a second alignment element, said second alignment element including an opposite end which engages a recess disposed on the front surface of the second substrate;

positioning the first and second substrates in stacked relation relative to one another such that the front surfaces face the same direction;

positioning the alignment elements within the recesses disposed within the first and second substrates; and

aligning the depressions of the alignment member with the alignment elements such that the periphery of the second substrate extends beyond the first substrate and the micro-components disposed on each of said substrates passively align.

19. The method according to claim 18 wherein the micro-components align in direct vertical registry.

20. The method according to claim 18 further comprising the step of:

disengaging said alignment member and said alignment elements with said first and second substrates.

21. A method for mechanically aligning micro-components disposed on first and second substrates, comprising the steps of:

providing first and second substrates each having a front surface including at least one depression disposed thereon which faces a first direction, said second substrate including a periphery which extends beyond said first substrate;

providing an alignment member having a first alignment element for mechanically engaging the depression disposed on the front surface of the first substrate and at least one second alignment element for mechanically engaging the depression disposed on the front surface of the second substrate,

positioning the first and second substrates in stacked relation relative to one another such that the front surfaces face said first direction and said periphery of said second substrate extends beyond said first substrate; and

mechanically engaging the first alignment element with the depression disposed on the first substrate and mechanically engaging the second alignment element with the depression disposed on the second substrate such that micro-components disposed on each of said substrates are aligned.

22. The method according to claim 21 further comprising the step of:

disengaging said alignment member and said alignment elements with the depressions of said first and second substrates.

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